THE FLESHY FUNGI OF RILEY AND GEARY COUNTIES

by

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INTRODUCTION

The importance of fungi in general, especially those pathogenic to plants, has long been recognized (17). Of the different groups of fungi, the Phycomycetes, Ascomycetes and the smuts and rusts of the Basidiomycetes are well known because of the damage they do in causing diseases of plants. The Autobasidiomycetes, while perhaps the best known in a general way by the layman, are also of great economic importance. From the negative standpoint many of the Autobasidiomycetes are of importance in that they are poisonous, while others cause many destructive diseases of trees. On the other hand some of the Autobasidiomycetes are useful food plants while the good accomplished by the saprophytic forms in causing decay and disintegration of organic matter can not be overestimated.

Although general surveys listing the fungous flora of Kansas have been made in the past with one exception (3) little has been done in determining the occurrence of specific types in definite localities in the state. Dr. Elan Bartholomew made the most complete list of the fungi of Kansas that has yet been made. Due to lack of space, his list, while very inclusive, did not name the host plant nor did it include the descriptions and habitats of the various species.

In this paper, in addition to some general information concerning the ecology of the fungi, there will be listed those Autobasidiomycetous fungi which have been found by the writer in Riley and Geary Counties, together with descriptions and brief notes as to their habitats, hosts, etc.

PHYSIOGRAPHY OF RILEY AND GEARY COUNTIES

The surface of these counties may be described as a high table-land of rolling prairie with an altitude of about 1300 feet above sea-level. Slightly over 4 per cent of these counties is timbered. The timber is almost wholly confined to the margins of the rivers and creeks (1).

Four great river systems drain Geary and Riley Counties and have an important effect in influencing the general topography. The Republican River has formed a valley approximately 2½ miles wide, bordered by bluffs which for the most part are over 100 feet high (9). On these short layers of limestone are exposed.

The river bottoms about 2½ miles north and northwest of Junction City are sandy and contain many true wind-blown dunes. Many of these are now covered with vegetation.

The topography of the region along the Smoky Hill, the Kansas, and the Blue Rivers is similar to that bordering the Republican River.

The soil of the valleys is alluvial and is composed of decayed vegetable matter to which has been added the alkalies generated by the ashes from the fires that for ages have swept over the surface consuming the tall grasses and other vegetation. Both counties have soil especially well adapted to cereal crops. There is a rather wide variety of timber plants of which the most abundant are: cottonwood, oaks, elm, black walnut, soft maple, black locust, ash, linden, sycamore, mulberry, boxelder, and coffee-bean (14).

These counties are located within an irregular belt of country known as the Flint Hills Uplands. The eastern boundary is marked by a compound escarpment characterized by the outcrop of limestones. The removal of shales which succeed the highest beds of limestone has given rise to a structural plain developed in the upper surface of these resistant beds (14). The northeastern portion of this locality seems to be a terminal moraine formed during the Ice Age. There exists on top of carboniferous bluffs overlooking the Kansas River, boulders of quartz; also southeast of St. George there is a development of a terminal moraine (9). In the western portion of the counties the character of the prairie is rolling and the bluffs which characterize the eastern portion are absent.

ECOLOGY OF FUNGI WITH SPECIAL REFERENCE TO FLESHY FUNGI

Mycologists who have studied the ecology and distribution of fungi have noted that those forms growing in soils rich in material from spruces and pines, differ from those found in forests of broad-leaved trees; also it is a common observation that the shade-loving species are seldom found in open pastures (16).

It has been computed that about 64 per cent of the Agarics are terrestrial, 7 per cent flourish habitually on dead leaves or dead stems of herbaceous plants, and nearly 30 per cent grow upon decaying wood (16).

Differences in environment may totally change the appearance of a species. Thus in the absence of light Lentinus tigrinus and Polyporus squamosus occasionally resemble the antlers of a deer (16).

Abnormal growths are not uncommon although their cause is not known in every instance. Agarics with resupinate pileoli, for example, are frequently encountered.

It is a disputed question whether there is a connection between the habitats and nutrition of the different species and their specific and generic characters. Some mycologists state that the color of the spores, texture and content of the pileus and other features vary according to the environment. Hence they believe that closely related species should not be separated until after their development under similar conditions of environment has been studied. Cooke and Berkley (16) while studying the effect of shade and nutrition upon different types of vegetation showed that an oak, beech, and birch forest in which there were very few fleshy fungi, produced them in abundance shortly after the trees had been cleared away. In those regions where refuse had been burned, many charcoal loving forms, among them *Clavaria fistulosa* and *Humaria amphalodes*, appeared.

Fairy rings, caused by the formation of fruiting bodies of Autobasidiomycetes, occur for the most part in grass lands but have been recorded in many cases in forests. These grass lands are not very fertile and the grass is short and yellow. Nitrogenous manuring discourages development of the fungi (15).

Investigators differ in explaining the reason for the development of fairy rings. Wallaston (1807) came to the conclusion that the cause for their regular annual progression was that the central area of the ring had been exhausted of some particular "pabulum" necessary for further growth of the fungus. Some attribute their outward progression to the fact that the active mycelium occurs only on the outside of the ring; others believe it may be due to more abundant food and water in the new soil. The inside of the large rings may be occupied by many smaller rings of other varieties (15). This perhaps has lead to the assumption held by some (15) that the outermost fruiting bodies are formed by fungi which are exhibiting a negative response to antagonistic forms which inhabit the area towards the center of the ring. The kinds of fungi that have been known to form rings are: *Lycoperdon gemmatum*, *L. Wrightii*, *Calvatia*, *Marasmius oreades*, *Agaricus campestris*, *A. arvensis*, *A. tubularis*, *Tricholoma personatum*, *Amanita phalloides*, *Boletus*, *Clitocybe*, *Collybia*, *Cortinarius*, *Hydnum*, *Inocybe*, *Lactarius*, *Lepiota*, *Morchella*, and *Paxillus* (15).

The production of fruiting bodies seems to depend largely on the soil and weather conditions. One ring of *Agaricus gigantium* fruited only once during a 50-year period (15). An experiment was carried on (1907-1917) at Akron, Colorado, with an *Agaricus* and a *Calvatia* ring. During four of the years the Agaricus fruited in June, while the Calvatia fruited in that month every year with the exception of three. Soil and moisture were the chief factors in controlling the fruiting of these fungi. If during May and June the first and second feet of soil were moist throughout, these fungi fruited rather abundantly. The mean temperature during the years of most abundant production of fruiting bodies was from 57° to 67° C. (15).

The fruiting bodies of Agaricus produced when the weather conditions are favorable have rough pileoli, while the fruiting bodies produced during adverse conditions have smooth tops. The effect on Calvatia was not so pronounced (15).

The demands of fungi as to heat are not so specific as are those of higher plants (7). The most luxuriant fungous vegetation occurs in the autumn when the growth of trees has ceased. The optimum temperature for fungi as well as for other plants varies greatly. The perennial Polypores, the Fomes, and some Agarics are able to resist the frosts and cold of winter, though most of the fleshy fungi bear new fruiting bodies each year.

According to their method of nutrition, fungi may be classed broadly as parasitic or saprophytic. It is difficult to determine the condition under which the plant is growing in some instances. Some fungi can live only as parasites, while others, like *Agaricus melleus*, obtain their food either as parasites or saprophytes. Some parasites (*Polyporus igniarius*) may enter the host plant only through wounds, while others (*Agaricus melleus*) may gain entrance to an uninjured growing plant.

Each fungus that lives on the wood destroys it in some distinctive manner. Some excrete powerful enzymes which dissolve the lignin and other materials found in the cell wall, while others may dissolve particles of calcium oxalate, etc., where the hyphae touch the cell walls (2). Butler has shown that *Polyporus squamosus*, which parasitizes the sycamore, destroys the wood of that host largely through the agency of the enzymes cytase and hadromase, though he also showed that the fungus may produce 6 or 7 additional enzymes.

Saprophytes as a rule can exist under a wider range of conditions than parasites can (4). The power to monopolize a given area is clearly demonstrated by some types of fungi (12). *Volvaria*, a pink-spored Agaric, spread rapidly throughout a bed of *Agaricus campestris* crowding out the latter. *Clitocybe nebularis*, a white-spored Agaric took possession of another bed of *Agaricus campestris* and none of the original variety reached maturity. According to Harshberger a Coprinus, which grows normally in great quantities on manure heaps might have been expected to be the intruder, but it has never been known to replace a bed of mushrooms. It has been shown (12) that when a struggle between two species belonging to two color groups takes place for a locality suited to both as far as outside conditions are concerned, the white-spored species or its nearest ally gains precedence over the dark-spored group. White and pink spored species predominate over the darker spored mushrooms, while on the other hand, the purple-spored species will not tolerate the encroachment of a black-spored Coprinus on its domain. The reason for this has not been explained by the author.

Fungi are not indiscriminately scattered even in such a limited area as Geary and Riley Counties. Upland, lowland, sandy, and swamp species exist. Various species of Boleti, Paxillus, etc., are characteristic of the pine forest. In the oak and other broad-leaved forests white-spored species predominate, whereas, in pastures pink-spored species occur the more commonly (12).

TAXONOMIC CHARACTERISTICS OF THE BASIDIOMYCETES

The true fungi include three classes, the Phycomycetes, the Ascomycetes, and the Basidiomycetes. The Basidiomycetes are more closely related to the Ascomycetes than to the Phycomycetes as they have few structures homologous to those produced in the latter group. The Basidiomycetes are characterized by the production, in connection with their perfect or sexual stage of distinctive club-like structures, the basidia, upon which typical exospores, usually called basidiospores, are borne. The basidium is clearly homologous with the ascus of the Ascomycetes, differing from that structure in the exogenous production of its spores.

While the mycelium of the Basidiomycetes, like that of the Ascomycetes, is typically septate, it may often be identified by the presence of clamp connections. These are not always found but their presence definitely identifies the mycelium studied as that of a Basidiomycete.

The Basidiomycetes are usually sub-divided into subclasses based upon such features as the origin of the basidium, the type and location of basidiospores, their tendency to propagate by budding, etc.

Some authorities divide the group into three subclasses, viz., the Hemibasidiomycetes, Protobasidiomycetes, and the Autobasidiomycetes while others divide it into the two subclasses, Hemibasidiomycetes and Eubasidiomycetes (5).

The Hemibasidiomycetes and Protobasidiomycetes differ from the Autobasidiomycetes in the origin and nature of the basidium, and to some extent in the location of the basidiospores and their subsequent behavior. Thus the promycelium or basidium of the Hemibasidiomycetes develops by the germination of a chlamydospore. This promycelium or hemi-basidium is not so clearly homologous with the basidium of the Autobasidiomycetes as the promycelium of the Protobasidiomycetes is; hence the name, Hemibasidiomycetes. Also, in the Hemibasidiomycetes the basidiospores may be borne upon the promycelium either terminally or laterally and in many genera they show a distinctive ability to form secondary basidiospores by budding. The basidiospores of the Protobasidiomycetes do not possess the ability to bud, are borne on sterigmata, and the promycelium is produced somewhat like a true basidium, thus indicating a close relationship to the Autobasidiomycetes.

The Autobasidiomycetes have several distinctive characteristics which distinguish them from the Hemibasidiomycetes and Protobasidiomycetes. Sporulation is nearly always preceded by the formation of a definite fruiting body (sporocarp) within which basidia originating as terminal cells of hyphae are produced. Basidiospores are borne terminally. They never bud but germinate by producing a germ-tube. The basidium differs from that of the two lower subclasses in its origin, i.e., from mycelium, in the fact that it is continuous and in that it produces basidiospores only at the tip.

Morphology of a Typical Sporophore

A compound sporophore of a typical Autobasidiomycete (Agaricus) consists of a short fleshy stalk called the stipe, which is connected to the substratum by united strands of mycelium called rhizomorphs. At the upper end of the stipe an umbrella-like expansion, the pileus or hymenophore, is borne. Numerous lamellae or gills are produced on the under side of the pileus. The hymenium or surface layer of the gill when mature consists of three structures; (1) the basidia with their sterigmata and basidiospores, (2) cystidia, and (3) paraphyses. The remainder of the pileus is made up of two tissues, the subhymenium which underlies the hymenium and that portion within the subhymenium called the trama.

The primordium of a sporophore is composed of a mass of slender, dense hyphae which is surrounded by a layer of loosely arranged hyphae. The rupturing of this outer layer, called the universal veil, frequently results in the formation of a cup-like structure called the volva at the base of the stipe. Occasionally a portion of the veil adheres to the pileus thus forming the calyptra. At first differentiation is limited to the development of two internal areas, rich in protoplasm which form the annular layer within the sporophore. From these areas hyphae grow down to form the primordial hymenium. Just before the hymenium is formed, the four primary parts, pileus, stem, marginal veil, and hymenophore, begin to differentiate. The gill cavity forms beneath the annular area and the gills grow downward into it. Upon the surface of the gills club-shaped structures called basidia are borne. Each basidium has four processes called sterigmata which bear conidia called basidiospores (6).

LIST OF THE FLESHY FUNGI OF RILEY AND GEARY COUNTIES

UNDERCLASS - HYMENOMYCETES
  ORDER I. AURICULARIALES
    Family 1. Auriculariaceae
      Genus: Auricularia
  ORDER II. TREMELLALES
    Family 1. Tremellaceae
      Genus: Tremella - Exidia
  ORDER III. DACRYOMYCETALES
    Family 1. Dacryomycetes
      Genus: Guepinia
  ORDER IV. HYMENIALES
    Family 1. Agaricaceae
      Tribe (1) Leucosporeae
        Genus: Pleurotus

Genus: Marasmius
Lactarius
Collybia
Hygrophorus
Lentinus
Schizophyllum
Tribe (2) Rhodosphoreae
Genus: Clitopilus
Claudopus
Entoloma
Leptonia
Pluteus
Volvaria
Tribe (3) Ocresporeae
Genus: Pholiota
Tribe (4) Melanosporeae
Genus: Coprinus
Psathyrella
Tribe (5) (Brown spored)
Genus: Agaricus
Family 2. Hydnaceae
Genus: Hydnum
Irpex

Family 3. Boletaceae

Genus: Boletus

Family 4. Polyporaceae

Genus: Elfvingia

Hapalopilus

Stereum

Bjerkandera

Coriolus

Lenzites

Polyporus

Poronidulus

Funalia

Pycnoporus

Irpiciporus

Fomes

Trametes

Daedalea

Merulius

Spongipellis

UNDERCLASS - GASTROMYCETES

ORDER V. PHALLALES

Family: Phallaceae

Genus: Phallus

ORDER VI. SCLERODERMATALES

Family: Sclerodermataceae

Genus: Scleroderma

ORDER VII. LYCOPERDALES

Family: Lycoperdaceae

Genus: Lycoperdon

Calvatia

Geaster

Bovistella

SUBCLASS - HETEROBASIDIOMYCETES

ORDER I. AURICULARIALES

Family 1. Auriculariaceae

Genus: Auricularia

Auricularia auricula judae

Pileus: Gelatinous ear-like, clustered

Color: Brown

Habitat: Dead twigs and branches of hickory and willow.

ORDER II. TREMELLALES

Family: Tremellaceae

Genus: Tremella = Exidia

Tremella or Exidia glandulosa

Pileus: Gelatinous, brown, foliaceous small masses

Habitat: Hemlock branches.

ORDER III. DACRYOMYCETALES

Family: Dacryomycetaceae

Genus: Quepinia Fr.

Quepinia spathularia Fr.

Pileus: Irregular cup-shaped - orange colored, sessile

Hymenium: On one side only

Habitat: Decaying deciduous wood.

ORDER IV. HYMENIALES

Family: Agaricaceae

Genus: Agaricus

Agaricus campestris

Pileus: 5-12 cm. broad, white to light brown--also flesh white

Gills: White--first--then pink and at last brown or black.

Stipe: White, fleshy, 5-8 cm. high

Veil: Soon disappears

Habitat: Lawns, pastures, gardens, and cultivated fields.

Agaricus arvensis

Pileus: 5-10 cm. broad, white or yellowish

Gills: White, then pink, at last brownish black

Stipe: 8-15 mm. broad

Veil: Double

Habitat: Fields and sometimes under trees.

Genus: Pleurotus Fr.

Pleurotus ostreatus Jacq.

Pileus: Fleshy, convex, smooth, moist, white tinted, ash color, or brown

Gills: White or tinted with ash; broad, growing down the stem, branching again and again at the base.

Stipe: Short or wanting

Flesh: White, tough

Habitat: On dead wood. Shells sometimes four inches across.

Pleurotus sapidus Kalchb.

Pileus: Convex or depressed, smooth, irregular. White, yellowish, light grey, or brownish. Overlapping, 2-5 inches broad.

Gills: White, distant, growing down stem

Stipe: Stems more or less united at base. Smooth, white, eccentric, 1-2 in. long.

Spores: White, changing to lilac.

Habitat: In clusters on decayed wood.

Pleurotus ulmarius Bull.

Pileus: Convex or nearly flat, firm, smooth. White or brownish yellow.

Gills: Broad, not crowded, notched at stem. White, turning yellow with age.

Stipe: United to cap one side of center. Usually curved; solid, smooth, or downy; white or whitish; 2-4 inches.

Flesh: White, not tender.

Habitat: Conspicuous on dead parts of standing elms.

Pleurotus petaloides Bull.

Pileus: Somewhat spathulate in form 2-10 x 1-5 cm.

Margins involute. Pure white to pale brown.

Gills: Narrow, white or yellowish, crowded, decurrent.

Stipe: Short, white, attached to edge of pileus.

Habitat: Tree trunks (decaying).

Genus: Marasmius

Marasmius oreades Fr.

Pileus: Fleshy, tough, 1-2 in. broad.

Gills: Broad, not crowded, yellowish, rounded at stem, unequal.

Stipe: Whitish, slender, dense coat, woolly hairs. Length of stipe 1-2½ inches.

Annulus: None.

Spores: White.

Flesh: Thin, white, tough.

Habitat: Grassy places. May form rings.

Marasmius rotula Fr.

Little wheel. (McI.)

Pileus: Very small.

Stipe: Thread-like.

Spores: White.

Habitat: Fallen leaves.

Genus: Collybia Fr.

Collybia platyphylla Fr.

Pileus: Convex, expanded, plain, turned up in age. Whitish to gray brown. Surface marked in radiating streaks of fine dark hairs.

Gills: White, broad, adnexed, broadly notched next to stem.

Stipe: Hollow about 2 cm. thick, woolly white substance at base.

Spores: White.

Habitat: On rotten wood. Ground near stumps.

Collybia velutipes Fr.

Pileus: Viscid, dark brown.

Gills: Waxy, yellow. Not crowded.

Stipe: Slender, hairy at base.

Spores: White.

Habitat: In or on dead limbs or tree trunks.

Collybia radicata Fr.

Pileus: Flattened, fleshy, viscid, wrinkled radially, grayish white to umber.

Stipe: Long, slender, rooted, striped.

Gills: White, broad, distant, adnexed.

Habitat: Rich earth.

Genus: Hygrophorus Fr.

Hygrophorus miniatus Fr.

Pileus: Vermillion - bright red, 2-4 cm. broad.

Gills: Yellow, adnate.

Stipe: Bright red, 2-5 cm. high.

Habitat: Woods, on ground or decaying limbs.

Hygrophorus psittacinus Fr.

Pileus: Bell-shaped, red and other colors. Similar to miniatus.

Habitat: Pastures, meadows.

Genus: Lactarius

Lactarius chrysorrheus Fr.

Pileus: Depressed in center, upturned margin. White.

Gills: Crowded, white--bruised become yellow. Brittle.

Stipe: Slender, white.

Habitat: Along borders of woods in grass.

Genus: Lentinus

Lentinus lecomtei Fr.

Pileus: Tough, brown, leather color,
hairy margin incurved.
Gills: Narrow, crowded, coarsely serrate.
Stipe: Short, hairy.
Habitat: Worldwide, on trunks, logs
(decaying).

Genus: Schizophyllum

Schizophyllum commune

Pileus: White, downy, tough.
Gills: Split into two laminae, revolute.
Stipe: None.
Habitat: Decaying wood, fallen limbs.

Genus: Clitopilus Fr.

Clitopilus prunulus Fr.

Pileus: Fleshy, convex becoming almost
plane, center slightly depressed.
Whitish, then salmon, decurrent.
Mealy odor and taste.
Stipe: A little on one side.
Habitat: Ground in woods, late summer
to autumn.

Genus: Claudopus

Claudopus nidulans (Pers.) Pk.

Pileus: Sessile, caps numerous, crowded, overlapping, 1-5 cm. broad. Surface tomentose. Yellow or buff color.

Gills: Broad, orange yellow.

Spores: Pink.

Habitat: Dead branches in autumn.

Genus: Entoloma Fr.

Entoloma strictus Pk.

Pileus: Convex, expanded margin incurved. Umbonate, smooth, hygrophorous, umber color, striate along margin.

Gills: Grayish white, distant, 3-6 cm. broad.

Spores: Rose color.

Stipe: Color same as pileus, hollow, striate, 6-8 cm. high.

Habitat: On ground in woods.

Genus: Leptonia Fr.

Leptonia incana (?) Fr.

Pileus: Thin, umbilicate, surface scaly.

Gills: Adnate, easily separating from stem.

Stipe: Smooth, tapering toward pileus.

Habitat: On ground in woods or in grassy open places. Odor - mice.

Genus: Pluteus Fr.

Pluteus cervinus Schaeff.

Pileus: Fleshy, bell shaped, convex then expanded, smooth, sooty color.

Gills: Distant, broad, free from stem, white then pink.

Stipe: Nearly equal, solid, smooth.

Habitat: On ground from rotten roots or on rotten logs.

Genus: Volvaria Fr.

Volvaria volvaceae Pers.

Pileus: White-yellowish, silky, globose. Flesh white, 6-20 cm. broad.

Gills: Crowded, flesh to tan color, ragged edged.

Stipe: Tapers from base to apex, solid, smooth.

Spores: Rosy, volva large, bag-like.

Habitat: On decayed wood of logs, stumps, etc. Late summer and autumn.

Genus: Pholiota Fr.

Pholiota praecox Pers.

Pileus: Convex then expanded. White to cream yellow, leather color, fleshy, moist.

Gills: Adnate, crowded, white.

Spores: Rusty brown.

Stipe: Stuffed, striate above annulus.

Volva: Frail, sometimes breaks from stipe and clings to margin of pileus.

Habitat: Lawns, meadows, roadsides.

Pholiota adiposa Fr.

Pileus: Yellowish to dark brown. Convex then expanded. Margin enrolled. Viscid.

Gills: Adnate, yellowish.

Stipe: Tapers downward, scaly.

Spores: Yellow.

Habitat: Clustered. On trunks of trees, stumps, etc. Autumn - winter.

Genus: Coprinus Pers.

Coprinus atramentarius (Bull.) Fr.

Pileus: Cylindrical then cone-shaped. Grayish to grayish brown. Deliquescing. 1-3 inches in diameter.

Stipe: Slender, smooth, white, hollow.

Annulus: Slight, near base.

Gills: Crowded, white then black, dripping.

Spores: Black.

Habitat: Rich soils.

Coprinus comatus Fr.

Pileus: Barrel-shaped, white - black surface, shaggy, 1½-3 inches.

Stipe: White, smooth, hollow, 3-4 inches long.

Gills: Crowded, white, pinkish black, deliquescing.

Habitat: Loose rich ground, pastures, lawns, etc.

Coprinus micaceus Fr.

Pileus: Bell-shaped, color tan, buff, glistening scales in young.

The remainder of the description is similar to other Coprini.

Genus: Psethyrella Fr.

Psethyrella disseminata Pers.

Pileus: Whitish-gray. Very thin, bell-shaped, scaly-plaited.

Gills: Adnate, broad, white, gray, then black.

Spores: Black.

Stipe: Slender, hollow, often curved, 2-3 cm. high.

Habitat: In tufts on decaying wood also ground.

Family: Polyporaceae

Genus: Elfvingia

Elfvingia lobata (Schw.) Murrill.

Pileus: Dimidiate, .5 x 10 x 1½ cm.

Surface: Subzonate, glabrous, becoming grayish brown with age; margin thin, creamy-white, smooth, entire. Context chestnut-colored, slightly zonate.

Habitat: Found on oaks, causes decay of trunk. Peculiar in being annual.

Elfvingia megaloma (Lev.) Murrill.

Pileus: Hard, dimidiate, applanate. Size 6-15 x 8-30 x 1-4 cm.

Surface: Milk-white to gray, glabrous, concentrically sulcate, encrusted. Margin obtuse, white, entire to undulate; corky context, hard, zonate, fulvous to bay colored.

Tubes: Evenly stratified, separated by a thin layer of context.

Habitat: Dead trunks of deciduous trees causing decay of heart wood and sapwood of almost all conifers.

Genus: Hapalopilus

Hapalopilus gilvus (Schw.) Murrill.

Pileus: Corky, dimidiate, imbricate, applanate. Size 3-6 x 5-10 x 0.5-1.5 cm.

Surface: Finely tomentose to glabrous. Azonate, brownish, may have purplish bands. Margin thin, entire to undulate.

Tubes: Short, slender mouths, small regular, circular to angular.

Habitat: Deciduous woods. It has been found on red cedar.

Genus: Stereum

Stereum albobadium Fr.

Pileus: Silky or strigose. Hymenium even.

Spores: Colorless.

Habitat: On rotten slash.

Genus: Bjerkandera

Bjerkandera adusta (Willd.) Karst.

Pileus: Imbricate, decurrent, conchate, fleshy, tough to corky. Size 2-4 x 4-8 x .2-.4 cm.

Surface: Undulate, pallid becoming black.

Tubes: Smoky colored, primrose when young, black when old.

Habitat: Dead deciduous wood. Rare on conifers.

Genus: Coriolus Quel.

Coriolus nigromarginatus (Schw.) Murrill

Pileus: Imbricate, dimidiate, applanate, corky, leathery, thick, flexible or rigid. Size, 3x5x.3-.8 cm.

Surface: Very hirsute, tan, concentrically furrowed and zoned; margin thick.

Tubes: tough, entire, white, circular.

Habitat: Dead deciduous wood.

Coriolus versicolor Quel.

Pileus: densely imbricate, very thin, dimidiate, conchate, 2-4 x 3-7 x 0.1-0.2 cm.

Surface: Smooth, velvety, shining, conspicuously zoned; various colors, mostly bay or black. Margin thin, entire.

Habitat: Dead wood. A wound parasite in catalpa.

Coriolus prolificans (Fr.) Murrill

Pileus: Variable, usually flabelliform.

Surface: Finely tomentose. White to yellowish.

Tubes: 1-3 mm. long, white, mouths irregular.

Habitat: Common on dead deciduous trees.

Coriolus hirsutus

Pileus: annual, shelving.

Surface: Tomentose, zoned, golden brown.
Margin thin.

Pores: Small, regular.

Habitat: Fallen limbs.

Genus: Lenzites

Lenzites tradeum

Pileus: Small, annual, sessile epixylous.
White, flexible.

Hymenium: Lamellate, radiating gill-like.

Habitat: Dead deciduous trees. Rare on conifers.

Genus: Polyporous

Polyporous Curtisii (Berk.) Murrill

Pileus: Corky to woody, soft, zonate.
Yellow above, fulvous below.
Size 5-10 x 8-15 x 1-3 cm.
Margin entire, obtuse.

Stipe: Eccentric or lateral.

Habitat: Decayed trunks and stump of oak and other deciduous trees.

Polyporus gilvous

Pileus: Shelving, velvety brown above, bay below. Margin thin, repand.

Pores: Very small, irregular.

Habitat: Dead deciduous trees.

Polyporus velutinus

Pileus: shelving to resupinate, white to yellowish, velvety, slightly zoned above.

Pores: Very fine, mouths round.

Margin: Thin.

Habitat: Decaying stump of deciduous tree.

Polyporus arcularius (Scop.) Murrill

Pileus: Circular, convex umbilicate.

Surface: Azonate, acute, nearly glabrous.

Tubes: Decurrent, white to brown, mouths large.

Stipe: Central, slender, tomentose at base.

Habitat: Dead branches and stems of various trees.

Genus: Poronidulus Murrill

Poronidulus conchifer (Schw.) Murrill

Pileus: Thin, flabelliform. Sterile cup.

Surface: White, pale zones, cup black.

Margin: Thin, undulate.

Tubes: Short, white, mouths irregular.

Habitat: Dead elm branches.

Genus: Funalia Pat.

Funalia stuppea (Berk.) Murrill

Pileus: Corky to woody, decurrent, convex above.

Surface: Hirsute, gray above, tan below.

Margin: Thin or rounded, entire, duplex, softer above.

Tubes: Long mouths angular.

Habitat: Dead poplar trunks, sometimes willow.

Genus: Pycnoporus Karst.

Pycnoporus cinnabarinus

Pileus: Annual, sessile, slightly zonate.

Surface: Tomentose, orange to red orange.

Margin: Acute (except when plant is large)

Tubes: Long with small mouths, regular.

Habitat. Dead woods of deciduous trees.

Genus: Irpiciporus

Irpiciporus lacteus (Fr.) Murrill

Pileus: Annual, sessile.

Surface: White, toothed.

Tubes: Short, irregular, white; edges uneven, soon splitting into teeth, pointed.

Habitat: Dead branches and trunks of deciduous trees.

Genus: Fomes

Fomes fulvus Gill.

Pileus: Woody to corky, convex.

Surface: Gray, glabrous to velvety.

Habitat: Plum tree, scar tissue.

Fomes pomaceous

Pileus: Woody to corky, flat.

Surface: Golden brown, glabrous to velvety.

Habitat: Apple and crab trees.

Fomes igniarius Gill.

Pileus: Woody, sessile. Size 6-7 x 3-7 x 5-12 cm.

Surface: Smooth velvety to glabrous, brown.

Tubes: Evenly stratified, mouths small, circular

Margin: Obtuse, hoary when young.

Habitat: On living trunks of deciduous trees. Causes heart rot.

Genus: Trametes Fr.

Trametes mollis

Pileus: Annual, sessile.

Surface: White to yellowish.

Tubes: Uneven, mouths rather large, regular.

Habit: Decaying fallen limbs.

Trametes Peckii

Pileus: Shelving.

Surface: Tan above, brown below, tomentose above.

Tubes: Rather long, uneven, mouths large, regular.

Habitat: Decaying stumps.

Genus: Daedalea

Daedalea ambigua Berk.

Pileus: Corky, sessile, simple, applanate. Size 8-12 x 10-20 x .5-1.5 cm.

Surface: Glabrous, polished, milk white to yellowish.

Margin: Thin, entire to undulate.

Tubes: Circular to labyrinthiform, white.

Habitat: Dead trunks of deciduous trees.

Daedalea confrugosa Bolt.

Pileus: Corky to woody, sessile. Size 2-7 x 3-10 x .5-1.5 cm.

Surface: Multizonate, glabrous.

Margin: Thin, entire to lobed, fertile.

Tubes: Porose to labyrinthiform, deep. Mouths gray when young.

Habitat: Many forms of deciduous wood.

Genus: Merulius

Merulius corcium Fr.

Hymenophore resting on loose like mycelium, covered by a soft waxy hymenium.

Surface: Wrinkled, folded, forming irregular pores. Sometimes toothed.

Habitat: Usually dead wood.

Genus: Spongipellis

Spongipellis unicolor Schw.

Pileus: Large, spongy, often ungulate.

Size 5-7 x 10-15 x 3-5 cm.

Surface: Spongy, tomentose, smooth, white.

Margin: Thick.

Tubes: Long, mouths large, irregular.

Habitat: Diseased living oak, maple and other deciduous trees.

UNDERCLASS - GASTROMYCETES

ORDER V. PHALLALES

Family: Phallaceae

Genus: Phallus

Phallus impudicus

Cap or pileus: Reticulate ridges.

Stem or stipe: Hollow tapering at each end; upper end joined with the cap by a recurved border.

Veil: Wanting.

Volva: Pinkish.

Habitat: Low ground, woods.

ORDER VI. SCLERODERMATALES

Family: Sclerodermataceae

Genus: Scleroderma

Scleroderma vulgare

Peridium: Small, white to greyish, rough.

Outer coat: Much tougher than in Lycoperdon. Opening irregularly.

Habitat: Grassy places.

ORDER VII. LYCOPERDALES

Family: Lycoperdaceae

Genus: Lycoperdon

Lycoperdon gemmatum Batsch.

Peridium: Rough, globose, white, small.

Outer coat: Thin, papery, opening by an apical mouth.

Habitat: On ground or rotten tree trunks.

Lycoperdon pyriforme

Peridium: Pear-shaped, dingy white or brownish. Diameter ¾-1½ inches. Height 1-2 inches.

Outer coat: Thin, minutely scaled, opening by an apical mouth.

Habitat: Woodlands, clearings on decaying wood, sawdust.

Genus: Calvatia

Calvatia cytheformis or (Lycoperdon cytheforme) Bosc.

Peridium: Very large, obovoid or top-shaped, depressed above.

Outer coat: Smooth, thin, fragile, easily peeling off. Pallid or grayish.

Spores and threads: Violet to dark purple.

Habitat: On ground in meadows and pastures. August - October.

Calvatia maxima or (Lycoperdon gigantea) Batsch.

Peridium: Very large, 8-15 inches in diameter, globose, with a thick cord-like root.

Outer coat: Nearly smooth, thin, and fragile. White or greyish, becoming yellowish or brown. Base remains in ground.

Habitat: Meadows. August - September.

Genus: Geaster

Geaster hygrometricus

Peridium: Globose, depressed, vaulted underneath.

Outer coat: Segments acute at apex; many lobes, seven to nine; ½-1 in. Mouth at apex fringed.

Spores: Brown, warted.

Habitat: Grassy ground.

Genus: Bovistella

Bovistella Ohioensis

Peridium: Globose, wrinkled underneath, cord-like base.

Outer coat: Heavy, warty, white, or greyish.

Spores and capillitium: Loose, clay color.

Habitat: On ground in pastures and open woods.

SUMMARY

A survey was made to determine the specific types of Autobasidiomycetous fungi growing in Riley and Geary Counties. A study of the physiographical features and other ecological factors was made to determine what effect they might exert upon the general flora and upon the occurrence and distribution of the higher fungi.

Fleshy fungi belonging to the following orders have been found by the writer in Riley and Geary Counties.

Order	Number of Species
Auriculariales	1
Tremellales	1
Dacryomycetales	1
Hymeniales	56
Phallales	1
Lycoperdales	6
Sclerodermales	1

Of these at least two species, *Claudopus nidulans* and *Volvaria volvaceae*, have been found which have not been listed heretofore as occurring in Kansas.

BIBLIOGRAPHY

1. Anonymous.
(Early) History of Kansas.

2. Atkinson, George Francis
1903. Mushrooms Edible and Poisonous. Andrus & Church.

3. Bartholomew, Elam
1927. The Fungous Flora of Kansas. Kans. Agr. Exp. Sta.

4. Cook, M. C.
1871. Handbook of Fungi No. 788. Macmillan Co.

5. Fitzpatrick, H. M.
1921. Lectures on Mycology. Cornell University.

6. Harshberger, J. W.
1917. General Physiology of Fungi. P. Blakiston's Son & Co.

7. Hartig, Robert
1901. Ecology of Fungi. Macmillan Co.

8. ________
1894. Diseases of Trees. Macmillan Co.

9. Hay, Robert
1896. Geology of Fort Riley Military Reservation, Kansas.

10. Johnson, Minnie May
1929. The Gasteromycetes of Ohio. The Ohio State Univ. Press.

11. Marshall, Nina L.
1901. The Mushroom Book. Doubleday, Page & Co.

12. Massee, George
1899. A Text-book of Fungi. Macmillan Co.

13. Murrill, W. A.
1914. Northern Polypores. (The author.)

14. Physiological Divisions of Kansas. Kansas Trans. Acad. Sci. Vol. XVIII. 1902.

15. Shantz, H. S. and Piemeisel, R. L.
1917. The Fairy Ring Mushroom. Jour. Agr. Res., 11: 200-213.

16. Swanton, E. W.
1909. Fungi and How to Know Them. London, Methuen & Co.

17. Transeau, E. N.
1919. General Botany. Macmillan Co.

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Date Due